

Claimed is:

- 1) A magnetic field modulation system for a cochlear implant surgically implantable into a human ear, the ear consisting in part of an auditory canal, the auditory canal having inserted therein an audio signal processor, switching amplifier and at least one microphone for receiving and processing auditory signals and a middle ear space having an intact tympanic membrane disposed therebetween, the magnetic field modulation system comprising:
- a) a transmitting coil positioned in said auditory canal adjacently spaced from said tympanic membrane;
 - b) a receiving coil positioned in the middle ear adjacently spaced from the tympanic membrane;
 - c) said transmitting coil having a constant thickness and a diameter derived from the space separating said receiving coil and said transmitting coil;
 - d) said transmitting coil receiving auditory signals from said switching amplifier, said transmitting coil electromagnetically coupling said received audio signals to said receiving coil; and
 - e) means connected to said receiving coil for demodulating and transmitting said electromagnetically coupled audio signals to the cochlea.

- 2) The magnetic field modulation system of Claim 1, wherein said transmitting coil is matched to the switching amplifier such that the coil operates in synchronization with the switching frequency of the amplifier.
- 5 3) The magnetic field modulation system of Claim 1, wherein said transmitting coil is matched to the switching amplifier such that the coil operates coupled directly to the amplifier outputs.
- 10 4) The magnetic field modulation system of Claim 1, wherein said transmitting coil's position is axially aligned with the position of said receiving coil.
- 15 5) The magnetic field modulation system of Claim 1, wherein said receiving coil's position is angularly disposed to said transmitting coil's position.
- 6) The magnetic field modulation system of Claim 1, wherein the spacing between said transmitting coil and said receiving coil is about 1 mm to about 7 mm.

7) The magnetic field modulation system of Claim 1, wherein said receiving coil comprises:

- a) a first C-shaped coil;
- b) a second C-shaped coil juxtaposition said first C-shaped coil;
- 5 c) a pair of spaced apart transfer bridges connectively disposed to said first and said second C-shaped coil's open end points; and
- d) means for operationally connecting said transfer bridges together thereby securing said receiving coil within the confines of the middle ear.

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8) The magnetic field modulation system of Claim 1, wherein said receiving coil comprises:

- a) a C-shaped hub;
- b) a C-shaped dual lobe receiving coil;
- 15 c) said C-shaped dual lobe receiving coil being slidably insertable into said C-shaped hub; and
- d) means for operationally securing said C-shaped hub and C-shaped dual lobe receiving coil thereby securing said receiving coil within the confines of the middle ear.

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- 9) The magnetic field modulation system of Claim 1, wherein said means connected to said receiving coil for demodulating is a capacitor operationally disposed to said receiving coil.

- 10) A magnetic field modulation system for a cochlear implant surgically implantable into a human ear, the ear consisting in part of an auditory canal, the auditory canal having inserted therein an audio signal processor, switching amplifier and at least one microphone for receiving and processing auditory signals and a middle ear space having an intact tympanic membrane disposed therebetween, the RF coil system comprising:
- a) a transmitting coil positioned in said auditory canal adjacently spaced from said tympanic membrane;
 - b) a receiving coil positioned in the middle ear adjacently spaced from the tympanic membrane;
 - c) said receiving coil have a capacitor operationally disposed thereto;
 - d) said transmitting coil having a constant thickness and a diameter derived from the space separating said receiving coil and said transmitting coil;
 - e) said transmitting coil receiving auditory signals from said switching amplifier, said transmitting coil electromagnetically coupling said received audio signals to said receiving coil, said capacitor demodulating said received audio signals, and
 - f) an electrode operationally connected to said receiving coil, said electrode transmitting said electromagnetically coupled audio signals to the cochlea.